2.1 Picturing Motion

Main idea: you can use motion diagrams to show how an object's position changes over time

I. All Kinds of Motion

A. Scientific processes can be communicated through models, graphs, etc. This is critical in order to analyze motion

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B. Changes in Position

1. Motion is all around you
   a. objects move in different ways
   b. there is a variety in types of motion (straight line, elliptical,)

C. Movement in a straight line

1. follows a path directly between two points without turning left or right
   a. description of motion is a description of place and time

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b. you must explain where an object is and at what time in order to clearly communicate motion

II Motion Diagrams

A. representing motion: a series of images are used

B. consecutive images: object in motion is compared to its background: this indicates that the object is in motion

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C. Combining images (a layered image)

1. multiple images with the same background

2. Motion diagram: a series of images showing the positions of a moving object at equal time intervals

III Particle Models

A. It is easier to monitor the motion of an object by keeping track of one point on an object

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B. Particle Model - in a particle model, you replace the object or objects of interest with single points

1. common in the study of physics
2. To use a particle model, the object's size must be less than the distance it moves

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Physics Ballringer:

How do you know where something is?

How do you find the cafeteria?

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2.2 Where and When?

Main idea: a coordinate system is helpful when you are describing motion

Review vocab: dimension - extension in a direction, one dimensional: along a straight line; three-dimensional (3-D) is height, width, and length

I. Coordinate Systems

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A. Coordinate System: gives the location of the zero point of the variable you are studying and the direction in which the values of the variable move

1. Origin - the point at which all variables in the coordinate system have the value 0
   → Figure 6

a. position - the distance and the direction of an object

b. distance - the entire length of an object's path, even if the object moves many directions

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→ arrow length represents distance

2. Negative position - object is behind point of origin (Figure 7)

II Vectors + Scalars

A. Many quantities in physics have size, which is called magnitude, and direction

B. Vector - a quantity that has both direction and magnitude

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C. Scalar - a number w/out any direction
   1. time, temp, etc (examples)
   2. Time intervals are scalar (Figure 8)
      a. time interval = difference between times
      b. $\Delta t = t_f - t_i$

D. Positions and Displacement
   1. Displacement - a change in position from initial position to end (final) position
      a. $\Delta x = x_f - x_i$ = displacement
      b. Figure 9
      c. sometimes a t or - will be used to indicate position

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